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The Database of Demining Accidents: - a driving force in HMA

by Andy Smith

[A strangely edited version of this paper was published in the JMU Journal of Mine Action, Summer 2011.

This is something closer to the original.]

I started the Database of Demining Accidents (DDAS) in 1998 using public data gathered for the United States Army Communications-Electronics Command, Night Vision & Electronic Sensors Directorate. When they declined to publish and update the database, I did so with their tacit approval but no funding support. I did this in the hope of improving safety for deminers. The database is an easy-to-use system containing the original demining accident reports overlaid with easy-search summaries.

DDAS Influence on Humanitarian Mine Action (HMA)

Having a collection of field reports about demining accidents and the context surrounding them has influenced the evolution of the [International Mine Action Standards \(IMAS\)](#). Basing IMAS content on empirical evidence rather than received wisdom enhanced and contributed to the general acceptance of the IMAS. But when the IMAS were taken over by UNMAS in 2011, they became compromised. No longer independent, the IMAS are led by an organisation with one of the worst records for recording and sharing lessons learned from accidents.

During the drafting of IMAS 2001, the DDAS proved invaluable in settling disputes about basic demining safety considerations. At that time, the received wisdom was that deminers lay down to excavate, should wear personal protective equipment with ballistic helmets and back-panels, and that the most common demining accident involved stepping on a mine. Deminers' protective visors had to be 13-millimetres thick, and casualty evacuation by helicopter was required at all sites. Not surprisingly, these "idealised" U.N. standards were not being applied by any U.N. programme.

In the absence of other data, the U.N. standards (1997) were crippled by excessive caution that made them entirely impractical and of no value to field operatives. When the U.N. standards were abandoned in favour of "International Standards", the evidence in the database of demining accidents was used to establish the following:

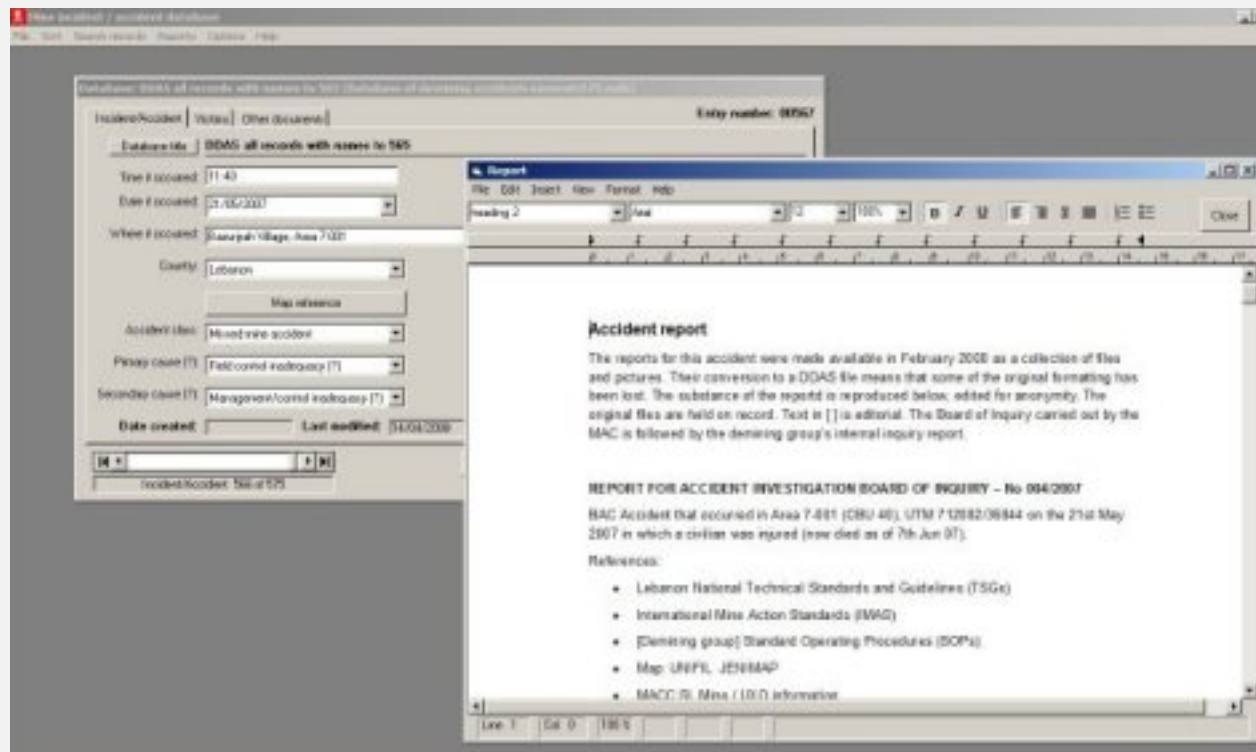
- The activities conducted when accidents occur;
- The mines/devices involved in accidents;
- The areas of the body most in need of protection;
- The effectiveness of protection used;
- The working methods most common around the world;
- The limitations of commonly used metal-detectors;
- The shortcomings of some mine-detection dog procedures and processes;
- The minimum level of medical provision needed; and
- That mechanical demining was not the panacea it was claimed to be.

With the database as evidence, it was possible to show the following:

- In almost all cases, deminers did not lie down to excavate: they knelt or squatted;
- Anti-Personnel blast mines were the most common device involved in accidents;
- Severe eye and hand/arm injuries were more common than severe leg injuries;
- Heavy PPE was rarely worn correctly;
- No commonly used PPE could provide appropriate protection against the close-quarter detonation of a fragmentation device;
- There was no reason to believe that a ballistic helmet or armour back-panel were necessary during demining tasks;
- High-tech blast boots were of no proven advantage and could give false confidence, while common footwear (not designed to prevent blast injury) was equally effective/ineffective when stepping on the smallest mines;
- Safer working procedures were more likely to prevent severe injury than the use of more PPE;
- Traumatic injury was increasingly rare and could usually be stabilized in the field by appropriately trained and equipped paramedics; and
- Shortcomings in management, leadership and training could be identified as a primary or contributory cause in the majority of accidents.

Not all of these findings were universally accepted, but the evidence meant that they could not be ignored and a process of compromise within the IMAS Board membership could begin with the aim of achieving a pragmatic and

practical consensus.



The Database of Demining Accidents contains the original demining accident reports overlaid with a summary and easy-search facility. Always available on request, the database records were put online at <http://www.ddasonline.com> in 2006. This site receives an average of 500+ discrete visits a day, with the most popular topic being “Deminer training” (http://ddasonline.com/suggested_training_usesDDAS.htm).

Post-2001 IMAS Updates

The Database has provided evidence in support of several updates to the 2001 IMAS. Unsurprisingly, the relevant updates were all related to field safety in one way or another.

1) The distinction between “working-distances” and “safety-distances” in IMAS 10.20 was supported by accident data analysis that showed that the minimum safety-distances imposed for an anti-personnel blast-mine risk were frequently ignored and that secondary injuries only occurred when a second person was very close to the detonation. The required IMAS distance was actually a “safe distance” for a deliberate detonation (with a large safety margin) but was often impractical and unnecessary during field operations. A distinction between working-distances (when no deliberate detonations will occur) and safety-distances (when deliberate detonations will be made) was introduced. This allowed more people to work simultaneously in

many areas, thereby increasing efficiency. Incidentally, this may also have increased field safety by making supervision easier.

2) Evidence from the database was used to support the contention that the largest ERW in a minefield should not be presumed to be the greatest threat when determining working distances. It was decided that the greatest threat should be the largest device that could be detonated when using the selected procedures and tools. This meant that in mixed anti-personnel and anti-tank minefields, manual working distances could often be based on the anti-personnel mine threat.

3) As a result of evidence that visors were habitually not worn, or worn incorrectly, IMAS 10.30 was redrafted to allow other eye protection as a minimum. 5mm polycarbonate goggles became the minimum requirement (subject to a risk assessment), although full-face visors remained the preferred option.

4) The final wording of the first Land Release IMAS 08.20, 08.21 and 08.22 was also informed by a close knowledge of the accident record.

5) Changes to IMAS 09.30 Explosive Ordnance Disposal were informed by the EOD accident record.

6) The IMAS Technical Notes 10.20-02/09 for Mine Action on Field Risk Assessment depends heavily on an intimate knowledge of the accident record and the factors that commonly contribute to accidents.

7) A significant number of accident reports include elements that show the investigators did not know (or had misunderstood) the IMAS requirements. This has supported arguments for simplifying the language and presentation of IMAS documents - without much obvious success. The quality and consistency of IMAS documentation has fallen since the UNMAS takeover.

Research

The authority of the database as an objective record has

been widely accepted. Evidence from the database is frequently cited in academic papers (Post-Conflict Reconstruction Master of Arts at York, U.K., and doctorate research at University of Genova, Italy, for example). In the U.S.A, the Massachusetts Institute of Technology runs doctorate research requiring students to study accidents from the database, and other universities have asked for permission to link to the DDAS site. The Council for Scientific and Industrial Research, a government research institute in South Africa, has based several projects on the results of studying the DDAS. Between 2001 and 2010, technical inquiries to UNMAS were frequently answered with reference to DDAS accident records.

The database cannot be used to prove much statistically because it does not include all accident records and relies on the honesty and sometimes questionable objectivity of the original accident investigators. However, the database allows qualitative assessments backed by quantitative analysis, together providing compelling semi-quantitative evidence of general conclusions that are far more compelling than any individual's personal opinion. For an explanation of the quantitative and qualitative data analysis, see <http://ddasonline.com/observeinferDDAS.htm>.

Lessons Learned

In 2008, the author's DDAS analysis showed the following:

- > Failings in management and supervision have increased over time.
- > An increase of expatriate field supervisors who had limited knowledge or appropriate experience regarding humanitarian demining. Some suffered accidents; others were a direct cause of them.
- > Many expatriates routinely applied double-standards and did not comply with their own rules: Their leadership abilities were questionable. Evidence of this recurs within the database records when basic rules of minefield safety are not applied despite the presence of an expatriate on site. For example, in accident DDAS468 no interior mined-area marking was used to delineate the division between cleared and uncleared areas in a dense minefield. This was not an error but an expatriate decision. A deminer was killed when inadvertently entering the uncleared area, stepping on one mine and

falling onto another. An alternative and frequent example is the inclusion in accident reports of photographs showing expatriate supervisors inside the mined area while work is being conducted who are not wearing the required PPE. There are also several examples of recent expatriate fatalities in which PPE was not used and the demining organisation's SOPs were being broken.

- > Severe hand/arm injuries became more common than severe eye injuries, albeit by a very small margin.

- > Cheap (sub \$500) PPE was as effective as expensive PPE and often easier to use. Body protection aprons with a NATO STANAG V50 of 380 m/s were involved in more than 30 accidents and always provided effective protection, even when faced with boosted AP blast mines.

- > Visors used in the field more than five years shattered in several accidents, confirming that sun-hardening could be a problem (this led to UNMAS Technical Note 10.10 / 02 for Mine Action addressing the subject).

- > Wearing a full-face visor did not reduce the incidence of severe eye injury because it was so often raised.

- > The need for dedicated on-site ambulance vehicles was reinforced when an accident occurred in which the only vehicle, plus the only radio, were destroyed in an anti-tank mine accident at a remote minefield and several fatalities resulted.

- > Common training needs of deminers and medical staff were identified.

Some of these conclusions were difficult for IMAS Board Members or field practitioners to accept, but the evidence made them hard to reject.

Data Gathering and Security

Responsible field staff provide accident records because they understand that sharing this information might prevent the unnecessary repetition of avoidable accidents. UNMAS

has supplied a few accident records, but no one has conducted a comprehensive data-gathering exercise so the incomplete DDAS is the only useful record of accidents in the industry. The value of a good accident archive is recognised in all hazardous professions except, it seems, mine action.

The current number of recorded victims in the DDAS is close to 1,000. This includes all the records for some countries in some periods, which has allowed an assessment of the data-spread to conclude that the records are broadly representative of all injurious humanitarian-demining accidents.

Despite the current IMAS requirement for demining groups to share accident data, many do not. Accident secrecy has been a constant problem, arising sometimes out of loyalty to colleagues and sometimes because the investigators want to protect the victim's insurance payout. It is hard to criticize demining groups when UNDP, UNOPS and UNMAS are also reluctant to share any possibly embarrassing data. This makes no sense because the names of the victims, investigators or demining groups are not published so there is no real reason to avoid sharing accident details and the lessons that can be learned from them.

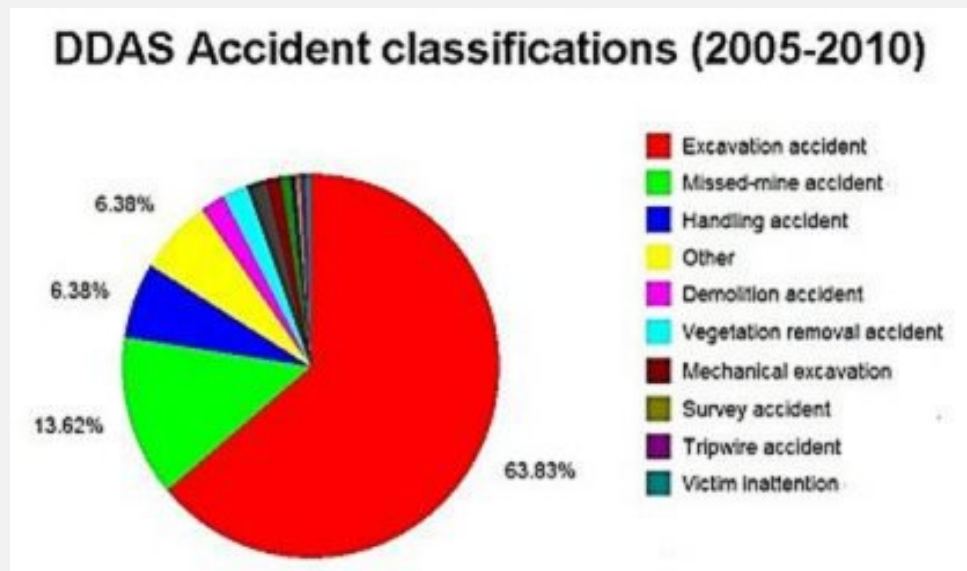
The database has been in the public domain for 15 years and the media or competing demining organizations have not abused it, implying that the removal of names and identifiers before publication has been successful in preventing abuse.

Future Uses

The weight of evidence within the database changes as new records are added. Currently, database evidence could be used to improve the safety of deminers in several ways, such as:

- 1) The use of purpose-designed blast-resistant hand tools can save fingers and hands. This has been known for more than a decade but overlooked by managers, conscious of insufficient resources, who instead provide cheaper alternatives such as gardening tools that put the user's hand on top of the blast, then shower the deminer with fragments as the tool breaks up. Compelling evidence exists for the use of purpose-designed, blast-resistant hand tools to be made a requirement (instead of a

recommendation) in IMAS 10.30.



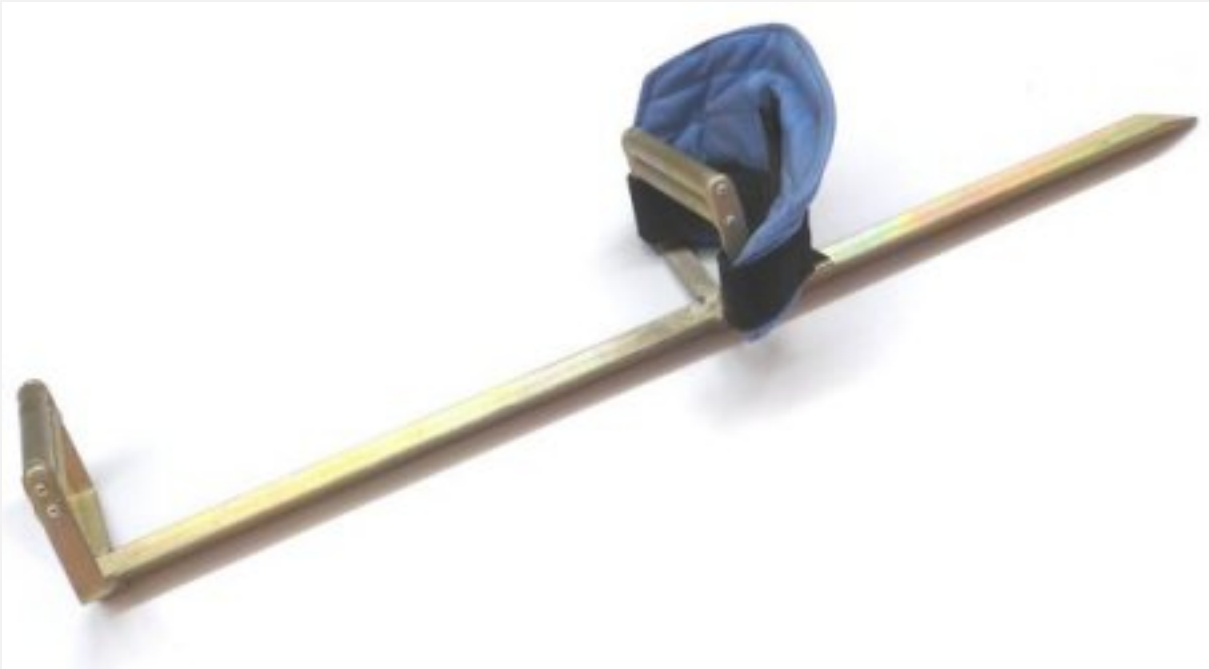
Accidents while excavating are now far more common than during any other activity.

2) Using a pickaxe has been common in some countries for at least 15 years. Clearing mines with a pickaxe sounds bizarre, but when starting an excavation in compacted or rocky ground, other tools can be ineffective and frustratingly slow. Banning the use of the pickaxe has been tried—and widely ignored. Engineers at MIT have designed an alternative tool that can do the same job as a pickaxe with reduced risk. The tool is far easier to guide the tip to the intended spot, requires less energy to use and reduces risk of severe injury if a detonation occurs.



A field trial of this MIT device in Sri Lanka during

2006 was a success but most people have never heard of the tool and it has not been widely used. The existence of a pickaxe alternative, designed to stay intact and protect the user's hands, should be publicized along with examples of accidents in which pickaxes were used.



A two-handed excavator designed at MIT to replace the pick-axe. I believe that if the Afghans were to adopt this tool, it would prevent at least a dozen severe hand injuries each year.

3) Manual deminers using metal detectors provide an archetypal image of the working deminer. While some deminers are skilled with metal detectors, evidence indicates that many deminers and their trainers do not understand the limitations of these tools, and they do not know how to use metal detectors with confidence and competence. For example, accidents have occurred when a detector is wrongly adjusted and is unable to detect the targets. Frequently, inadequate detector training has led to inaccurate pinpointing so that the excavation is started on top of the mine. The accident record contains abundant evidence supporting the need to improve metal-detector training at all levels (managers also need to know what will detect what) in mine-action.

4) The records contain frequent evidence that the appointment of international staff with inadequate knowledge of the IMAS or demining (despite high-level academic or military qualifications) can lead to increased risk for working deminers. In the field, experience and a

commitment to learning from others are more valuable qualifications than academic or military achievement. This could be stressed in the IMAS and put into practice by the U.N. agencies and various demining organizations.

5) From the earliest records to the present day, there are examples of new commercial organizations having accidents that repeat the obvious errors of previous accidents (recently, this has been especially obvious in Afghanistan). This implies that contract conditions need revising so that the deminer's safety shares the same priority as cost, and which require a knowledge of the history of demining (including accidents) where the contract is to be conducted.

6) The insurance provision for local deminers injured at work throughout humanitarian mine action is varied but always far less than an expatriate would expect. Generally, national deminers receive medical care and a single payment so low that it would be considered derisory in a Western environment. Despite some informal attempts to provide long-term support, there are no formal provisions for severely disabled deminers to receive a disability allowance or even long-term prosthetics and therapy assistance. Among the records, there is evidence of accident victims who have been abandoned and have died in extreme poverty or committed suicide. The number in dire circumstances can only be inferred because no comprehensive follow-up has been conducted. Improved provision for demining accident victims should be addressed.

Summary and Recommendations

The DDAS has been of proven value to the humanitarian mine-action industry. It has been “a driving force” in promoting practical change and the sharing of experience, in creating and updating the IMAS and in the field. An anonymous database, it protects the privacy of those involved in accidents while allowing others to learn from their experience.

As an industry, international mine action has not matured to the point where it is open and transparent about its accidents. Some individuals and groups at all levels

withhold or conceal information that could prevent future accidents. When organizations do not disclose accident data, the managers run the risk of appearing criminally negligent by ignoring their responsibility for the safety and occupational health of their staff. When U.N. agencies also conceal accidents and so not share lessons learned, they show that they are not responsible operators and so not deserve respect from professionals..

Deminers are the agents of those who fund Humanitarian Mine Action. They work to priorities that the donors have imposed, yet their treatment after an accident usually lacks any sign of the humanitarian concern that lay behind their employment. It is remarkable that a “humanitarian” industry has made no real effort to make long-term provision for them – despite interest shown in international forums by expatriate field practitioners who are concerned for their colleagues regardless of their nationality.

It is time for an agency to take the DDAS under its management, enforce the IMAS requirement for the sharing of accident records, and maintain the principles of anonymity and of keeping original accident reports on which the DDAS was founded. This would be a requirement in any responsibly controlled industry and is a glaring omission in humanitarian mine action. An agency should accept responsibility for gathering accident records, creating an archive and conducting informed analysis of that archive. I will make the extensive DDAS records that I have accumulated available when any credible initiative is proposed.

In response to my prompting for action, UNMAS asked (early 2011) the Geneva International Centre for Humanitarian Demining (GICHD) to gather accident data in a new system extending the “tick-box” accident records recorded in the Information Management System for Mine Action (IMSMA). They are to create a new database instead of updating the existing DDAS, so losing all records kept to date. The new version will ignore the detailed reports that provide the core of the DDAS and make it genuinely useful. Without the original accident report to refer to, analysis will rely on a brief summary made by an office-based staff member. The new UNMAS/GICHD initiative may succeed, but the result will be “shallow” because it will depend entirely on the many levels of interpretation between the accident event and the “tick” placed in an available box on a form. Such a database will not be professional, and will do little or nothing to prevent repeated accidents.

So while I wait for a credible alternative, the database is

being updated again. Demining accident records, questions and comments should be sent to me at [avs\(at\)nolandmines.com](mailto:avs@nolandmines.com).

Biography

The longest serving member of the IMAS board, Andy Smith has worked in humanitarian mine action since 1995. Demining jobs have included mine clearance, surveying, NGO CTA, TA and programme manager, and UNDP country HMA programme management. Not-for-profit research and development work has included developing safety equipment for use in HMA. Examples include the most commonly used blast visor and blast-resistant hand tools. Consultancy and contract work has included working for the U.S. government, UNDP, NGOs, universities, private companies and the Geneva International Centre for Humanitarian Demining.

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